

REMARKS

Claim 98 is cancelled herein. Thus, claims 55-70, 97 and 98-104 are all the claims pending in the application. Claims 55-70 and 97-104 stand rejected on prior art grounds. Applicants respectfully traverse these rejections based on the following discussion.

I. The Prior Art Rejections

Claims 97-99, and 101 stand rejected under 35 U.S.C. §102(b) as being anticipated by Antonie, et al. (U.S. Patent No. 4,593,820), hereinafter referred to as Antonie. Claims 55-69 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Steiner (U.S. Patent No. 4,291,404), in view of Miller, et al. (U.S. Patent No. 6,452,411), hereinafter referred to as Miller, and in further view of Henson (U.S. Patent No. 4,026,412). Claim 70 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Steiner, Miller, and Henson, in view of Roy, et al. (U.S. Patent No. 6,499,121), hereinafter referred to as Roy. Claim 100 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Antonie, in view of “Storing Test Results in Memory,” hereinafter referred to as Storing. Claims 102-103 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Antonie, in view of Roy. Claim 104 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Antonie, in view of Miller. Claims 55 and 63 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Steiner, in view of Miller, in further view of “Covering Things,” hereinafter referred to as Covering. Claim 97 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Miller, in view of “Doing Things While in Transit,” hereinafter referred to as Doing. Applicants respectfully traverse these rejections based on the following discussion.

A. Rejection Of Independent Claims 55 and 63 Based On Steiner, Miller and Hensen.

The Applicants traverse the rejection of amended independent claims 55 and 63 because the Steiner-Miller-Hensen combination does not teach or suggest each of the features claimed. The Applicants further submit that the cited prior art references also do not teach or suggest the desirability of the claimed invention (i.e., there is no motivation to combine the cited prior art references).

(1) Summary Of The Present Invention.

As discussed on page 1, the inventors of the present invention recognized that during production of integrated circuit chips and, particularly, of application specific integrated circuit (ASIC) chips, chips must often be transported between different locations (e.g., between a foundry and a module build house) and then tested. This testing adds to production costs and time. Therefore, the present invention provides a device and method for transporting integrated circuit chips (e.g., ASIC chips) and for testing those chips during transport (see page 3). As illustrated in Figures 1-5 and discussed in the associated text, the present invention comprises a box for transporting integrated circuit chips (see in-transit box 20 of Figure 2). Test boxes 10 are mounted in the in-transit box 20. Test boards 11 are mounted in each one of the test boxes 10 (see Figure 1). These test boards 11 are adapted to test the integrated circuit chips (or ASIC chips) as they are being transported (e.g., from one location to a different location).

Specifically, referring to Figure 3, each test board 11 has multiple sockets for holding and electrically connecting to multiple integrated circuit chips 30. Each test board 11 also has testing circuitry 31-34 (see also Figure 4) electrically connected to the sockets so that each of the chips 30 can be tested while they are being transported in the in-transit box 20. It should also be noted that the in-transit box 20 is self-powered (see page 12), thereby, allowing this testing to occur.

That is, the device includes a power supply in each of the test boxes 10. As illustrated in Figure 1, this power supply is connected to each of the test boards 11, and is adapted to supply power to the test boards during the transporting and the testing of the chips. For example, as discussed on page 5, each test board 11 can be connected to a test box power supply bus 12, which is powered by either a test box battery 13 or a lead 14 connected to a power bus 21 in the in-transit box 20. As discussed on page 13, this invention provides the benefit of eliminating chip tests at the receiving site because the parts are tested during the transit stage. Upon unpacking the chips, only fully tested/passing chips would be used.

(2) Summary Of The Cited Prior Art References.

Steiner teaches a miniaturized hand-held battery operated logic circuit testing apparatus for testing an integrated circuit chip in the field (see column 2, lines 5-15 and Figure 1). The portable device has a socket for receiving the device to be tested and is controlled by an operator using switches (see col. 3, lines 15-30). Miller teaches a system and method of parallel testing of integrated circuit devices. Specifically, Miller uses a known good device during testing and compares the results from testing of the known good device to results from testing multiple devices under test (see Abstract). Finally, Hensen recognized during manufacturing storage and transportation leads of microelectronic packages may be damaged (see col. 1, lines 32-40). Therefore, the Hensen discloses a circuit carrier for holding a microelectronics package and for restraining the leads to prevent damage (see col. 1, lines 42-46). The carrier further provides “interconnections so that the leads of the package can be electrically reached for the electrical testing of the package when it is thus protected” (see col. 1, lines 65-68).

(3) Lack Of Prima Facie Obviousness: Cited Prior Art References Do Not Teach Or Suggest Each Of The Claimed Features Of The Invention And There Is No Motivation To Combine The Cited Prior Art References.

Claims 55 and 63 are amended herein in order to clearly distinguish the claimed invention from the cited prior art references. In view of these amendments, the Applicants submit that the Steiner-Mill-Hensen combination does not teach or suggest the following features of amended independent claim 55 or the similar features of amended independent claim 63: (1) “a plurality of test boxes mounted in said in-transit box”; (2) “a plurality of test boards mounted in each one of said test boxes and adapted to test said integrated circuit chips during said transporting of said integrated circuit chips”; (3) “a power supply in each of said test boxes, connected to each of said test boards, and adapted to supply power to said test boards during said transporting and said testing of said integrated circuit chips”; and (4) “wherein each of said test boards comprises multiple sockets adapted to hold and electrically connect to multiple integrated circuit chips; and testing circuitry electrically connected to said sockets for testing said multiple integrated circuit chips.” The Applicants further submit that even if each of these features were taught by one or more of the cited references, there is no motivation to combine the cited references. Therefore, an obviousness rejection should not stand.

None of the cited prior art references disclose the claimed invention of a device for transporting integrated circuit chips and for testing the chips during transit. The Office Action cites Steiner as disclosing “a transportable circuit chip test device comprising: a transportable test box (See figure 1); a test board in said test box (See figure 2.); and a portable power supply in said test box connected to said test boards (From the abstract, “a battery operated ...”) wherein said test board comprises a socket adapted to hold integrated circuit chips to be tested while

being transported (See figure 1, element 10.); and testing circuitry electrically connected to said sockets (see figure 25).” The Applicants respectfully disagree.

As discussed above, Steiner teaches a miniaturized hand-held battery operated logic circuit testing apparatus for testing an integrated circuit chip in the field (see column 2, lines 5-15 and Figure 1). The portable device has a socket for receiving the device to be tested and is controlled by an operator using switches (see col. 3, lines 15-30). The motivation behind Steiner is to provide portable tester that allows for in the field maintenance work (see col. 2, lines 1-3). In other words the portable tester of Steiner is brought to the device to be tested. Steiner does not teach or disclose that the portable tester of Steiner is used in anyway for transporting the device, much less for testing the device during transport.

The Office Action further acknowledges that Steiner does not disclose the plurality of test boards or that each test board can hold more than one integrated circuit to be tested. Therefore, the Office Action cites Miller. The Applicant respectfully disagrees. Miller does not teach a device with a plurality of test boards mounted within a test box, each connected to a power supply, as claimed. Rather, as discussed above, Miller simply teaches a system and method of parallel testing of multiple devices. That is, Miller compares the results from testing a known good device to the results from testing other devices of the same type. However, Miller does not discuss connecting multiple ICs to sockets on multiple test boards, mounting multiple test boards within multiple test boxes having power supplies and mounting multiple test boxes within an in-transit box, etc.

Furthermore, the Applicants submit that there is no motivation to combine Miller and Steiner. The Office Action provides that “A person of ordinary skill in the art would have been motivated to test more than one integrated circuit on a plurality of receptacles because, from line

4 of column 2 of Miller et al. , it “increase[s] the throughput of the test system in terms of the number of DUTs tested per unit time”.” The Applicants respectfully disagree. Steiner recognized that a disadvantage associated with prior art portable circuit testers was that they were “large and impractical for use in field maintenance work” (see col. 2, lines 1-3). Steiner therefore provided “a miniaturized hand-held battery operated logic circuit testing apparatus using minimal components” (col. 2, lines 10-15). Miller on the other hand recognized that rigorous testing of chips must be performed prior to sending them to a system manufacturer (see col. 1, lines 17-34) and that there was a need to increase the throughput of the test systems in terms of the number of DUTs tested per unit time (see col. 2, lines 4-9). Thus, Miller provided a test apparatus that allows a connection with multiple devices under test and provides in parallel testing of the devices (see col. 2, lines 18-22).

Thus, Steiner is concerned with post-manufacture in the field maintenance, which benefits from a portable miniaturized testing apparatus for a single device. Contrarily, Miller is concerned with a larger tester capable of connecting to multiple devices in order to increase the throughput of the test system in terms of number DUTs tested per unit time. Given that Miller and Steiner deal with different testing periods (namely, testing during pre system assembly and testing during post-assembly maintenance) and given that the testing goals are different during these different time periods (namely, increasing devices tested per unit time and providing smaller easier to use portable testing devices), there would be no motivation to combine the apparatus of Steiner with the system of Miller.

Additionally, the Office Action acknowledges that neither Steiner, nor Miller disclose a test box that surrounds ICs. Thus, the Office Action indicates that covering an IC during testing is known in the art. Specifically, the Office Action cites the carrier of Hensen as teaching this

feature. The Office Action further provides that a “person of ordinary skill in the art at the time of the invention would have been motivated to cover DUTs during test because, as shown by Hensen, “encloses the body of the package and restrains the package leads for complete protection.” The Applicants respectfully disagree.

As discussed above, Hensen discloses a circuit carrier for holding a single microelectronics package and for restraining the leads to prevent damage (see col. 1, lines 42-46). The carrier of Hensen further provides “interconnections so that the leads of the package can be electrically reached for the electrical testing of the single microelectronics package when it is thus protected” (see col. 1, lines 65-68). Thus, while Hensen may provide motivation to use a carrier to cover the single device being tested by the portable tester of Steiner or to use multiple carriers to cover each of the multiple devices being tested by Miller, none of the cited prior art references provide motivation to use a single carrier to cover multiple devices as in the present invention. That is, there is no motivation in Steiner, Miller or Hensen to combine the single device carrier of Hensen with the multiple devices under test in Miller and the portable tester of Steiner in order to provide the in-transit box of the present invention, containing multiple test boxes, or to provide the test boxes of the present invention, containing a power supply and multiple test boards each capable of holding and testing multiple integrated circuit chips).

Therefore, the Applicants submit that amended independent claims 55 and 63 are patentable over Steiner in view of Miller in view of Hensen. Further, dependent claims 56-62 and 64-70 are similarly patentable, not only by virtue of their dependency from a patentable independent claim, but also by virtue of the additional features of the invention they define. Moreover, the Applicants note that all claims are properly supported in the specification and accompanying drawings, and no new matter is being added. In view of the foregoing, the

Examiner is respectfully requested to reconsider and withdraw the rejections.

B. Rejection Of Independent Claim 97 Based On Antonie Or Miller.

Independent claim 97 is amended herein in order to clearly distinguish the claimed invention from the cited prior art reference. In view of the amendment the Applicants traverse the rejection of because Antonie does not teach or suggest each of the features claimed. Specifically, the Applicants submit that Antonie does not teach or suggest the following features of amended independent claim 97: (1) “connecting integrated circuit chips to test boards having test circuitry”; (2) “mounting said test boards in test boxes having power supplies”; (3) “mounting said test boxes in an in-transit box”; (4) “transporting said integrated circuit chips in said in-transit box”; (5) “testing said integrated circuit chips during said transporting by using said test circuitry”; and (6) “supplying power to said integrated circuit chips during said transporting and said testing by using said power supplies.”

Per col. 2, lines 53-55, Antonie teaches a tester/sorter apparatus. Specifically, the testing mechanism is incorporated into the gripping fingers of a robotic arm (col. 2, lines 53-58). The mechanism allows a device picked up by the grippers at a pick-up point (col. 3, line 15), to be tested by the grippers when it is being displaced to a new location (col. 3, lines 17-23) and to be in different receptacles depending upon the test results (col. 3, lines 23-40). Each device is transported and tested individually. Additionally, each device is not mounted to a test board, which is mounted with other test boards in a test box with a power supply, which is mounted with other test boxes in an in-transit box, etc.

Again, as discussed above, Miller teaches a system and method of parallel testing of integrated circuit devices. Specifically, Miller uses a known good device during testing and

compares the results from testing of the known good device to results from testing multiple devices under test (see Abstract). Thus, Miller does teach testing integrated circuits device. However, the Applicants submit that it does not teach testing in the manner claimed. That is, nowhere in Miller does it teach or suggest “connecting integrated circuit chips onto test boards having test circuitry”; “mounting said test boards in test boxes having power supplies”; “mounting said test boxes in an in-transit box”; “transporting said integrated circuit chips in said in-transit box”; “testing said integrated circuit chips during said transporting by using said test circuitry”; and “supplying power to said integrated circuit chips during said transporting and said testing by using said power supplies.” Furthermore, while, as the Examiner suggests, “doing things in transit” is known, the Applicants submit that the claimed manner in which the integrated circuits are tested and simultaneously transported (as set out above) is also not known.

Therefore, the Applicants submit that amended independent claim 97 is patentable over Antonie. Further, dependent claims 99-104 are similarly patentable, not only by virtue of their dependency from a patentable independent claim, but also by virtue of the additional features of the invention they define. Moreover, the Applicants note that all claims are properly supported in the specification and accompanying drawings, and no new matter is being added. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the rejections.

II. Formal Matters and Conclusion

With respect to the rejections to the claims, the claims have been amended, above, to overcome these rejections. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the rejections to the claims.

In view of the foregoing, Applicants submit that claims 55-70, 97 and 99-104, all the claims presently pending in the application, are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary. Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 09-0456.

Respectfully submitted,

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